Research paper

Designing an intelligent command and control model for the Islamic Republic of Iran Army based on big data

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abstract

Intelligent Command and Control is a modern military concept that uses big data and advanced analytics to enhance decision-making and operational effectiveness. Machine learning algorithms and patterns can be used for intelligent command and control based on big data. This includes using reinforcement learning algorithms to make intelligent decisions, using neural networks to recognize patterns, predict behaviors, and using big data analysis methods to extract useful information from large military data. For example, predictive models can be used to predict military attacks or reinforcement learning algorithms can be used to optimize military resource allocation. The purpose of this research is to design an intelligent command and control model for the Islamic Republic of Iran Army based on big data. In this research, which is applied-developmental in terms of its purpose and descriptive-analytical in terms of its method; data collection was carried out in a library manner using questionnaires and interviews and in two qualitative stages, the Delphi method and quantitative (questionnaire). The statistical population of 63 people was selected as a whole. The designed model consists of 4 dimensions, three components for the 3 dimensions of the application layer, the data layer, and the infrastructure layer, and a data processing and analysis component for the data service platform dimension, for a total of 10 components and 60 indicators. The validity of the model has been confirmed using alpha calculation (above 0.676), composite reliability, and calculation of factor loading coefficients.

Keywords: Model, Command and Control, Multi-Domain Operations, Artificial Intelligence Technology, Big Data Technology, Iranian Armed Forces

Introduction

With the development of command and control systems and the use of satellite information sensors, electronic warfare systems, active and passive tracking radar systems, various types of fighters, unmanned aerial vehicles, smart weapons, etc., data is produced with high speed and variety and stored in these systems. If we do not use intelligent data analysis methods, we will actually be faced with a large volume of data; as a result, the use of big data technology leads to timely and real-time decision-making, less processing time and cost, high processing and analysis speed, comprehensive awareness and superior understanding of the battle space, improving the effectiveness of command and decision-making, the possibility of simulating and visualizing the battle scene, integrated and centralized management, and the intelligence of the command and control system, which has led to the development and intelligence of modern command and control systems (Azimizadeh, 2014).

In this research, by calculating the dimensions of components and indicators and ultimately designing a smart command and control model for the Islamic Republic of Iran Army based on big data to automate decision-making processes and enable faster and more effective responses to threats and changes on the battlefield, it enhances and improves the combat capability of the army.

Based on this model, the data generated from the battlefield is collected by the data generation layer, the analysis layer, the data processing layer, and the data exploitation layer management, and the required security measures are taken for each layer.

1. Generalities

1-1. Statement of the problem

The Intelligent Command and Control paradigm is a modern military concept that uses big data and advanced analytics to enhance decision-making and operational effectiveness. Machine learning algorithms and patterns can be used for intelligent command and control based on

Big data is used. This includes using reinforcement learning algorithms to make intelligent decisions, using neural networks to recognize patterns and predict behaviors, and using big data analysis methods to extract useful information from large military data. For example, predictive models can be used to predict military attacks or reinforcement learning algorithms can be used to optimize military resource allocation (Azimizadeh, 2014: 104).

The U.S. Army has incorporated big data into its command and control operations through the development of a multi-domain joint command and control intelligent command and control paradigm to enhance their interoperability and increase their effectiveness in achieving their objectives.

The current command and control model in the Islamic Republic of Iran Army is based on centralized and traditional decision-making systems that rely on human intelligence and judgment for data analysis and decision-making (Azimizadeh, 1401: 104).

Therefore, the main issue of this research will be the design of an intelligent command and control model for the Islamic Republic of Iran Army based on big data.

2.1 Importance and necessity of research

By introducing the intelligent command and control model of the Islamic Republic of Iran Army based on big data, the following can be achieved:

1. Achieving a solution to coordinate and align the activities of the AJA command and control area to support joint, multi-organizational and composite operations (support and combat services in the land, air, sea and space domains;

2. Designing a model to integrate (information) from multiple systems into a single system and integrate the dispersed systems of the Islamic Republic of Iran Army;

۳. Designing an appropriate solution to focus on decision-making, creating a centralized coordination system for activities, creating a systematic and reliable intelligent guidance and control system in the AJA command and control network;

On the other hand, the absence of the aforementioned pattern (necessity) causes:

۱. Increasing the knowledge and equipment gap between the Islamic Republic of Iran's army and the enemy's emerging and up-to-date defense capabilities of the world;

۲. Dispersed and insular policies of AJA command and control networks in the face of emerging defense technologies in AJA.

3.1. Research Background

Kosha, Hassan, (2019) in the article Designing an Integrated Command and Control System for the Khatam Al-Anbiya Air Defense Base (PBUH) in Accordance with Future Air and Missile Threats, the command and control system referred to in this thesis is based on the characteristics of C4&ISR command and control; in the area of future threats, it faces the issues and challenges of big data, and in this regard, it considers it necessary to have an integrated and coordinated defense structure with the command and control of the Islamic Republic Army (Kosha, 2019).

Molla Mirzaei and his colleagues (1400) in their article "Explanation of the Role of Big Data Technology in the Intelligence of Cyber Command and Control Systems" state that the results of the research indicate that, considering the characteristics of modern cyber command and control systems, big data technology supports the characteristics of decisive support for decision-makers, efficient data management, comprehensive awareness and superior understanding of the battle space, and can play an effective role in realizing the intelligence of these systems (Molla Mirzaei et al. (1400).

1.5 Research questions

1-5-1- Main question

What is the smart command and control model of the Islamic Republic of Iran Army based on big data?

1.5.2 Sub-questions

1. What are the dimensions, components, and influential indicators of the Islamic Republic of Iran Army's smart command and control model based on big data?

2 How reliable is the Islamic Republic of Iran's Army's smart command and control model based on big data?

1-6. Research methodology

This research is of an applied-developmental type, and its method is descriptive-analytical and its approach is a mixture of "qualitative-quantitative". In order to collect data, two library and field methods, in-depth interviews and questionnaires, were used. By conducting the aforementioned studies, the latest achievements and results of research conducted in the field related to the research topic were extracted. In the first step, all documents of scientific articles, reports and reliable scientific documents available in the field of technology development patterns, as well as the characteristics of big data technology and its development, were studied, and its main dimensions and components were identified through manual coding. In the second stage, the indicators specified in specialized meetings and in-depth interviews with an expert team of 10 experts and thinkers in the field of command and control of the Islamic Republic of Iran Army, university professors with a large and strategic management and executive experience in the field related to big data technology and emerging technologies, the dimensions of the components and indicators were examined and confirmed. In the third stage, the statistical population consisted of senior experts and technology development specialists in the Islamic Republic of Iran Army with a master's degree

and PhD and at least 5 years of work experience in the aforementioned specialty in the Army of the Islamic Republic of Iran at intermediate and executive levels and had complete mastery and familiarity with the research topic, which was estimated to be 63 people in total. Considering the volume of less than 100 people, the entire statistical sample was considered and was questioned by preparing a questionnaire to determine the indicators specified for the research topic. After scoring the dimensions of the components and indicators of the AJA intelligent command and control network based on big data, the validity and reliability of the questionnaire were also confirmed by calculating Cronbach's alpha. To measure the relationships of the latent variables "components" with their measurement items and indicators and to test whether the latent variables were measured correctly, the factor loading test in the external model in the Smart PLS software was used.

The time frame of this research was set at 5 years due to the rapid developments in information and communication technology, especially in the cyber domain, and it is necessary to review it after the aforementioned period. The organizational scope of the research is the Iranian Armed Forces.

2 Theoretical foundations of research

1.2 The concept of multi-domain operations

Multi-domain operations (MDO) refers to the concept of conducting military operations in multiple domains, including land, air, sea, space, cyberspace, and the electromagnetic spectrum, with the aim of achieving a military objective. In a multi-domain operation, military commanders and staff are required to integrate and utilize their capabilities in multiple domains to achieve a military objective. By utilizing advances in artificial intelligence, big data, and other emerging technologies, militaries aim to enhance their capabilities in multi-domain operations and increase their effectiveness in achieving their objectives (FM3-0,2022:31).

1. MDO: Multi-domain operations

Decision support systems and software agents have become explicit knowledge. This helps commanders and staff to make decisions more easily and focus more on values and judgment-based issues and less on technical analysis of issues (Mehdinejad Nouri et al., 2017: 213).

2.4- Advanced intelligent command and control service platforms with machine learning capabilities

The complexity of current C2 environments, the volume, variety, and velocity of data generated or collected, and the increasing operational speed have created the need for automated systems that can receive data in high volumes, process it with low latency, and extract actionable intelligence from it all, providing the ability to gain an advantage on the battlefield (Fardmaymir-Ducharme, 2018: 2).

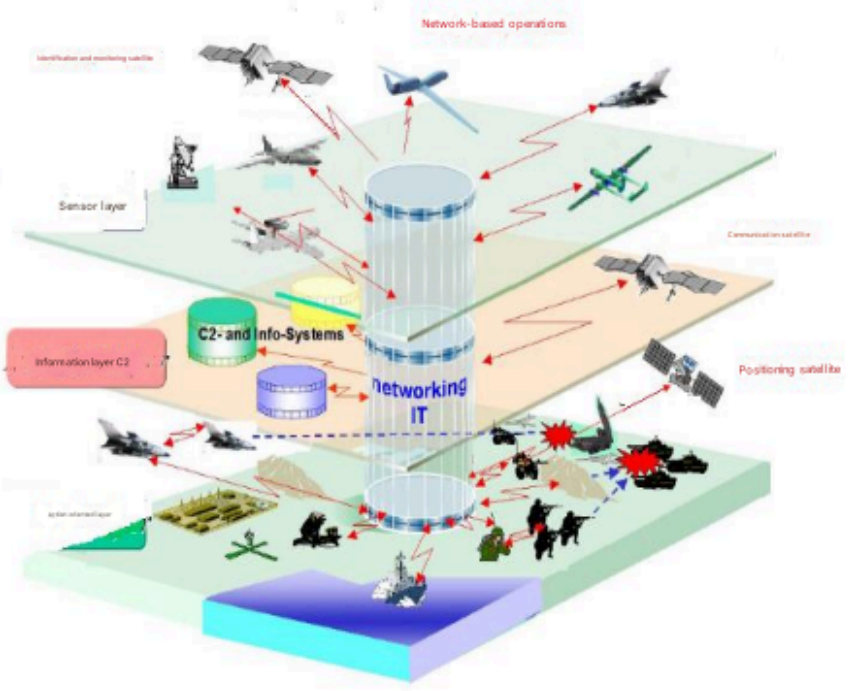

Figure: C2 model and individual-centered network warfare (Maymir-Ducharme, 2018: 6).

2- big data

High-volume, high-velocity, and high-variance information assets that require new processing and enable advanced decision-making, knowledge discovery, and process optimization (Garner Institute (2020))

2.6 Characteristics and characteristics of big data in the military environment

Di Mauro et al. (2016) proposed the definition of big data as an information asset with high volume, velocity, and variety requiring specific technology and analytical methods to convert it into value. The 67 characteristics are explained in detail below and are briefly mentioned (Seongjin Bak and Young-gab Kim, 2021).

Table 1 Big Data Specifications 6 for Military System 2 Column (Kjin Bak and Kim Book Bank 2021:112).

In the C2 military system	brief explanation	
- Expressing the concept of network-centric warfare and the emergence of many devices such as the Internet of Battlefield Things (IoBT), surveillance assets generate large volumes of data such as video/images, radio signals, etc.	A large amount of data	Volume
The increase in IoBT and the development of battlefield intelligence assets accelerates the increase in battlefield data; - High performance to support real-time or near-real-time decision making in a military operation	The speed of data growth Data flow rate	speed Velocity
Intelligence elements such as HUMINT (human intelligence), Signals Intelligence (MASINT), Measurement and Signature Intelligence (SIGINT), GEOINT, Geographic Intelligence (OSINT), Source Intelligence (source intelligence)	Different types of data types Different data sources	diversity Variety

In the C2 military system	brief explanation	
Open, etc. create different types of battlefield data volumes.		
Defense data center secures scalability by – introducing a cloud system Convert to data in a format suitable for devices connected – to the C2 system	Change data flow rate, format, structure, volume, etc.	Variability
On the battlefield, it is important to ensure that data is reliable for military operations and decision-making.	Data accuracy	Veracity
Input data is designed by assets available – on the battlefield; The output data is used for combat assets – with decision-making.	Valuable input/output data	Value Value

Table 2 Five-stage Big Data Lifecycle (Ku et al., 2020)

1. Structured data conforms to a database template, which is mainly characterized by the different fields to which the data belongs, such as name, badge, age, etc., as well as by the data type for each field, such as number, currency, letters of the alphabet, name, date, and badge; 2. Unstructured data refers to information that either does not have a predefined data pattern or is not organized in a predefined way. Photos, graphics, videos, text, audio recordings, streaming sensor data, etc. can be classified as unstructured data; Semi-structured data is a type of data that reflects both the characteristics of structured and unstructured data. Word processing documents including metadata such as author name and creation date, and photos uploaded to a social networking service (SNS) with tags are representative examples of semi-structured data.	gathering	1

4. Storage phase The data preparation process i.e. data aggregation and merging, data cleansing, data partitioning, data indexing, etc. should be included to store large volumes and diverse data formats appropriately. This phase briefly introduces two main technologies i.e. distributed file system and Map Reduce for implementing data storage; 5 Distributed file systems are the most popular infrastructure that can store huge data sets across multiple distributed storage pools; 6. MapReduce is a data-intensive programming language for processing large data sets on a cluster of distributed storage nodes.	Storage	2
Hossa Maldin et al. (2010) suggested that big data analysis can be classified into four aspects: descriptive analysis, inferential analysis, Diagnostic, predictive analytics, and prescriptive analytics use various techniques such as statistical analysis, data aggregation, data clustering, machine learning, etc. to obtain meaningful information or knowledge.	Analysis	3
The primary goal of the exploitation phase is to generate valuable information and knowledge through data analysis. To effectively utilize big data, a visualization tool or a decision-making tool that accurately understands and expresses the needs of users is essential.	Exploitation	4
Privacy data must be destroyed without delay after the data retention period has expired. In the military context, data destruction in accordance with security regulations is an essential element for ensuring the safety of military operations and protecting the command and control system.	Destruction	۵

7.2 Structure of big data-based command and control networks in the scene environment

the battle

1.7.2 Layered Big Data System Framework

According to the perspective of big data system configuration, this research proposes four layers of a framework. The data infrastructure, platform, and application layers of this classification are three frameworks, namely platform infrastructure and processing of big data systems mentioned in the Institute.

National Research Standards and Technology (NIST) and the three layers, namely big data fabric infrastructure and big data platform as a service and application, were designed by Koji Kang et al. (2020) Koji Kang et al., 2020)

1. Infrastructure layer This layer refers to the physical or virtual resources required in the entire big data lifecycle process for collecting, storing, analyzing, using, and destroying data. Infrastructure includes storage servers, IoT network devices, sensors, Internet web services, etc.;

2. Data Layer This layer stores and manages data in a big data system. To deal with the large volume and various forms of data in the data layer, it is necessary to have a suitable system. For example, partitioning, indexing and MapReduce technologies have been used in distributed file systems to store large amounts of data in multiple repositories and manage data efficiently. In addition, databases such as relational and NoSQL databases are required for different types of data;

۳. Big Data Service Platform Layer A big data platform may be defined as the middleware for implementing the big data functionality of a system (Kun et al., 2016). The Hadoop ecosystem is a representative platform for implementing big data. For example, HDFS, YARN, MapReduce, etc., design functions as unique modules for storing, processing, and managing data in big data systems;

٤. The application layer, depending on the context in which the big data system and the processed data are used, should use appropriate analysis methods and visual tools, which are covered by the application layer.

2.7.2 Three-tier system framework 2 in terms of battlefield data flow

According to the processes of production, processing and use of battlefield data used in the C2 system, it is divided into three layers, which are the data production, data processing and use layers.

The data is expressed in detail. Each layer is designed below and shown in Figure 3.

Seongjin Bak et al., 2021 (7).

Figure: Three-layer C2 system framework based on battlefield data flow, Stonkjin Bak et al. 2021 (7)

Data Generation Layer Examples of combat data generators include information assets, combat assets, combat support facilities, other Internet commands, etc. Combat data also includes sensor data from various IoBTs, GPS signals, image-video, audio-radio signals, document text, etc.

Data Processing Layer This layer is implemented in the integrated data center where the main stages of the big data lifecycle are implemented to store and analyze the collected data. Infrastructure means virtual physical resources like cloud computing, network devices etc. and the big data system platform may be like Hadoop, Cloudera etc.

Data exploitation layer This layer helps commanders make decisions by visualizing the data analyzed in the data processing layer as valuable information

Seongjin Bak et al., 2021 (7).

3.7.2 Security challenges and requirements related to big data in command and control networks

Figure (4) comprehensively shows the security requirements applied to each layer of the C2 system framework.

Figure 4 Proposed security requirements applied in a 3-layer framework

Stonekjin Pak et al. 2021 10)

2-7-4. Requirements for the operationalization of the AJA intelligent command and control model based on big data

A systematic approach can be used to design a conceptual model of a big data-based intelligent military command and control model that moves from the current state to the ideal state.

❖ existing situation

1. Traditional command and control: Using traditional command and control systems that operate based on limited information and human decision-making;

2. Limitations in data processing: Inability to process and analyze large volumes of data simultaneously;

۳. High level of human error Decision making based on human experience and judgment which may lead to errors.

A transformative approach to the smart command and control paradigm based on big data in the military involves the use of emerging technologies and advanced software to improve decision-making processes and data management. This approach includes the following:

❖ Main components

1. Intelligent decision-making: Using advanced algorithms to analyze big data and design decision-making options for commanders, including threat identification and situation assessment;

2. Integrated operation: Creating an integrated command and control system that provides the ability to coordinate between different forces, especially in joint operations.

Data generation (collection and integration) of time components
Data exploitation
Data visualization tools Web applications and
authentication on the device Data destruction
in critical situations
1) Test map analysis software and statistics)
(2) Machine learning software
) Data mining software
Graph visualization tools and with tools
Web application decision making for sharing
Data in crisis
layer
Data Diversity Data Volume Data Integrity
- Data Velocity Data Encryption Privacy
Mutability - Data Value
Unstructured data Semi-structured data
validation - Data encryption
(1) Smart weapons. Displays, security
phones, computer wall displays)
devices, endpoints, laptops,
Raw data
Database
Analyzed data
AC intelligent action feedback

Figure E: Conceptual model of intelligent command and control of the Islamic Republic of Iran Army based on big data

۳. Research findings and their analysis

1-3 Identifying and introducing the dimensions of the components and indicators of the intelligent command and control model of the Islamic Republic of Iran Army based on big data

To extract the indicators, through studying the sources and using the library method and coding manually (the first stage, as well as identifying the expert team and guiding them through this, the second stage and then in the third stage, a questionnaire was distributed. After receiving the scores based on the 5-option Likert scale, the average of the data from the questionnaire was calculated and, while designing the average scores and eliminating items with less than 3 points, a new scoring request was made from the expert team according to the calculated average score and new items.

Of the 10 questionnaires sent, 7 were answered, the results of which are shown in Tables 3 to 6 and have been approved by the supervisor and the expert panel.

Table: Average score of expertise related to the Big Data Application Layer dimension

Average score	Index title	Components	first dimension
4/59	Big data visualization tools	Big data production, collection and integration	layer of big data
12/4	Web applications and their security		
4/56	Equipment management tools Battlefield management software		
05/4	Anti-malware program		
4/22	User authentication on the device		
4/39	Data destruction in critical situations		
4/68	Data analysis software (statistics map, text, images, etc.)	big data analysis	
4/63	Terminology of educational and operational simulators of the battlefield)		
4/76	Software based on artificial intelligence and machine learning		
4/66	Data mining software		
4/39	Security for data analytics applications		
4/61	Visualization tools for charts, maps, text, report images, etc.	Exploitation of big data	
4/76	Decision tools		
4/29	Web applications and their security		
4/22	Security tools and programs (anti-malware, permissions)		
4/17	Maintaining privacy when distributing data		
۴/۴۴	Authentication on the device		
4/61	Destruction of data in crisis conditions		

Average score for expertise related to the Big Data Application Layer dimension = 4.45

Average score	Index title	Components	The second dimension
4/76	Big Data AI Service Platform	Big data processing and analysis	Big Data Services Platform Layer
4/68	Using advanced machine learning data analytics and artificial intelligence techniques to process analytics and extract actionable information from large volumes of structured, unstructured, and semi-structured data		
4166	Hardware and software required for decision support		
4/59	Adaptive learning and feedback loop		
4/41	Big Data Service Platforms		
4/54	Pattern recognition using machine learning, supervised learning, unsupervised learning, reinforcement learning		
4/39	Security for big data analytics service platforms		

The average score for expertise related to the Big Data Services Platform Layer dimension = 4.57

Table E: Average score of expertise related to the big data layer dimension

Average score	Index title	Components	The third dimension
4/51	Data diversity	Big data production, collection and integration)	big data layer
4/56	Data volume (the amount of data collected by sensors)		
4/73	Accuracy, precision and reliability of the collected data		
4/56	Velocity (the speed at which data is collected and processed)		
4/68	Data integration and transformation (the ability of the system to integrate data from different sources and convert it into data in a form suitable for devices connected to the C2 system)		

Average score	Index title	Components	The third dimension
4/56	value		
4/32	Data encryption		
4/39	Structured	Big data processing and analysis	
4/56	without structure		
4/41	Semi-structured		
4/73	Data management		
4/41	Data validation		
4/32	Data encryption		
4/61	Understandable data analyzed with data insight	Exploitation of big data	
4/24	Data encryption		

Average score for expertise related to the big data layer dimension = 4.50

Table 6 Average score of expertise related to the big data infrastructure layer dimension

Average score	Index title	Components	The third dimension
4/66	Sensors	Big data production, collection and integration)	Big data infrastructure layer
4/76	Fiber optic communication platform, wireless satellite network, data link		
4/54	Interoperability of various flexible and interactive networks of connection points to other (C2s)		
4/68	Information integration and correlation Information integration		
۴/۴۴	Security of the connection point		
4/24	Data encryption		
15/4	Authentication		
15/4	Privacy in accordance with privacy regulations)		
4/2	wireless security		

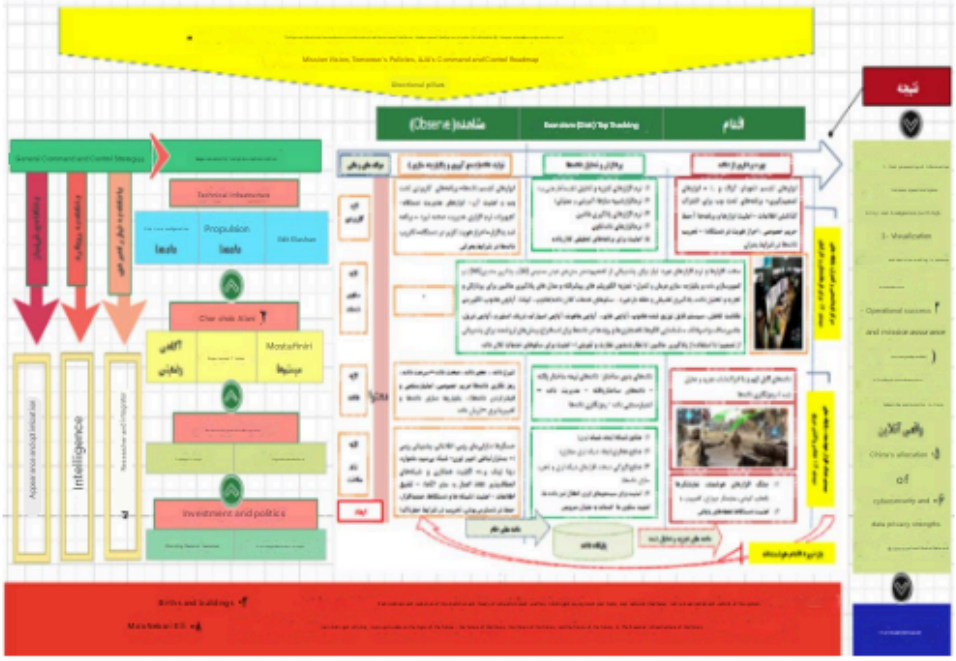

Figure 6: Intelligent Command and Control Model of the Islamic Republic of Iran Army Based on Big Data

2.3 Inferential statistics of the research model

After collecting the research data and in order to check their validity and evaluation, structural equation models were used to confirm or reject the obtained results. In this study, structural equation modeling and partial least squares (PLS) method were used to analyze the research data, test the hypotheses and fit the model.

To measure the internal consistency of a questionnaire, or the so-called reliability of a questionnaire, Cronbach's alpha is used to assess structural reliability. Cronbach's alpha has values between 0 and 1. and values above 0.67 indicate good structural capability of the PLS model. In the partial least squares method, the composite reliability (CR) criterion is considered a new criterion compared to Cronbach's alpha, so both criteria have been used to better measure reliability. According to the results obtained, Cronbach's alpha is above 0.5 and the composite reliability of the research variables (CR) is also above 0.7 in all variables, and therefore the reliability of the research model is confirmed; also

Since (0) of each variable is greater than 0.4, the shared reliability of all apparent variables is also confirmed.

۴- Factor loading coefficients of indicators relative to components

The factor loading test in the external model has been implemented in Smart PLS software, and the results have been processed.

The factor loading coefficients of the components and indicators of the intelligent command and control model of the Islamic Republic of Iran Army based on big data were designed in terms of the statistical population. All factor coefficients were greater than 0.4, which indicates the appropriateness of the relevant criterion.

٤. Conclusion and suggestion

By conducting this research, 4 dimensions, 10 main components and 60 indicators were identified. In response to the question, what are the dimensions of the components and indicators of the intelligent command and control model of the Islamic Republic of Iran Army based on big data? The dimensions of the big data application layer, the data layer service platform layer, and the big data infrastructure are the main dimensions of the intelligent command and control model of the Islamic Republic of Iran Army based on big data, and the components and indicators are:

❖ Data generation component (data collection and integration) (user layer dimension)

1 Big data visualization tools;

۲. Device management tools, device status, device location and equipment,

battlefield management software;

۳. Data destruction in critical situations;

٤. User authentication on the device;

Web applications and their security;

٦. Anti-malware program

Data processing and analysis component after the user layer) ❖

1. Software based on artificial intelligence and machine learning;

2. Data analysis software (statistical maps, text, images, etc.);

۳. Data mining software;

٤. Battlefield training and operational simulator software);

e Security for data analytics applications.

❖ Data exploitation component after user layer

1 decision-making tools;

2. Visualization tools (charts, text maps, photos, reports, etc.);

۳. Data destruction in crisis situations;

٤. authentication on the device;

Web applications and their security;

٦. Security tools and programs (anti-malware, permissions);

۷. Maintain privacy when distributing data.

❖ Data processing and analysis component (service platform dimension)

۱. Big Data AI Services Platform;

2. Use advanced machine learning data analytics and artificial intelligence techniques to process analytics and extract actionable information from large volumes of structured, unstructured, and semi-structured data;

۳. Hardware and software required to support the decision;

٤. Adaptive learning and feedback loops;

Identifying patterns using machine learning 1. Supervised learning; 2. Unsupervised learning;

3. Reinforcement learning

Data exploitation component after the data layer

1. Understandable and data-driven (analyzed);

Data encryption. ۲.

Data generation component (data collection and integration, data infrastructure layer)

1. Communication platform (fiber optic, wireless network, satellites, data links, etc.);

2. Integration and correlation of information from different sources (information fusion);

sensors; ۳.

Interoperability of connection points to others (C2s); ٤.

e security of the connection point;

data encryption; ٦.

Wireless security (monitoring and inspecting data traffic, overcoming jamming attacks); ۷.

Authentication of system access authorization; user authentication in the system; ۸

Privacy (in accordance with privacy regulations). ۹.

Data processing and analysis component (after the data infrastructure layer)

1 Network resources (cloud network creation);

2 Infrastructure Security as a Service

Physical resources (cloud network hardware and data storage); ۳.

Security for cloud network infrastructure ٤.

Secure transmission of system data;

Virtual resources (creating virtual cloud networks, virtual machines, etc.). ٦.

Data exploitation component (after the data infrastructure layer) ❖

1 Displays, smart devices, smartphone, computer wall display, etc.;

2. Security of endpoint devices belonging to various types of fiber optic networks,

wireless, satellites, data links, etc.;

۳. Endpoint security, data validation, network settings;

٤. Authentication of system access authorization; user authentication in the system;

Privacy (in accordance with privacy regulations).

In response to the second sub-question, "How is the validity of the intelligent command and control model of the Islamic Republic of Iran Army based on big data?" The validation of the model obtained from the statistical population's response was carried out based on the validity and reliability assessment of the questionnaire. By calculating Cronbach's alpha and composite reliability of the research variables and obtaining coefficients above 0.7, the reliability of the obtained model was confirmed. By calculating AVE and obtaining results above 0.5, the convergent validity of the research was achieved. By calculating the factor loading coefficients of the components and indicators and obtaining coefficients above 0.4, the appropriateness of the criteria was also confirmed. Considering the above-mentioned cases, the overall validity of the model was confirmed.

Suggestions

1. Developing strategies to improve the speed and security of the AJA intelligent command and control network based on big data technology;

۲. Developing standards and variables for each of the indicators related to the components of the model designed in the research;

۳. How to implement AJA's intelligent command and control network using big data technology;

٤. Designing AJA's intelligent command and control network by integrating emerging big data technologies (Internet of Things, military tactical cloud network, and distributed ledger technology, etc.).

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